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January 16, 2005

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Please find attached details of response to your office action of 10/23/2004. I have included a letter detailing each of the changes made in response to your comments, I copy of the patent application with markup shown and a clean copy of the patent after changes have been made.

The content of these changes does not include any additions to the claims in the original patent but rather serves to format, grammatically correct and clarify the content of the original application. Please let me know if any further or alternative documentation of this response is appropriate.

Regards

A handwritten signature in dark ink, appearing to read "F. J. Duncan Jr.", written over the printed name.

F. J. Duncan Jr.



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To: James M McAleenan  
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16 January 2005

Patent Application No. 10/605,512

James,

Thanks for the details in your office action of 10/23/04. I have attempted to address them in the response below. Please let me know if these are acceptable to you.

Regards

**Item 1 - Rejection of Drawings**

Find enclosed modifications to drawings 8 and 10 to encompass the illustration of the "mechanism allowing rotation around the axis of the housing while constraining axial motion (like that of a thrust bearing)" as described in Claims 1(paragraph c1) and 9(paragraph c8). The Brief description of drawings was also modified to include this in the following manner:

*In paragraph 26, delete the period at the end of the paragraph and add "and a typical mechanism to allow rotation around the axis while constraining axial motion."*

**Item 2 - Content of Specification**

**Title of Specification (item a)** – To better conform to the "preference" in size, modify the title of the patent from "*Helical device for conversion of fluid potential energy to mechanical energy*" to "*Helical device to convert potential to mechanical energy*"

**Items b-d** - These issues are not applicable to the application. The following language has been added following paragraph 1 to state the same:

*Cross-Reference to Related Applications:*

*Not applicable*

*Statement Regarding Federally Sponsored Research and Development:*

*Not applicable*

*Incorporation-By-Reference Of Material Submitted on a Compact Disc:*

*Not applicable*

**Background of Invention (item e)** - My interpretation of the comments in section e is that the verbiage I used in the "*Field of the Invention*" is more appropriately a portion of the "*Description of Related Art*" or "*Description of Prior Art*" as I entitled it, and additional content needs to be included to address the "*Field of invention*" section. Consequently, the following changes have been made:

Modify paragraph 4 from "*Description of Prior Art*" to "*Description of Related Art*"

Move paragraph 4 up one paragraph now placing it just before paragraph 3.

Add a new paragraph after paragraph 2 as follows:

*"The field of the invention is that of methods and apparatus for converting the energy of fluid mass at elevation into kinetic energy in the process of conveying the fluid to a lower elevation. One specific benefit of which would be the subsequent generation of electricity from said kinetic energy such as that accomplished in hydroelectric power generation."*

**Brief summary of the Invention (item f)** - Paragraph 18, currently empty is replaced with the following descriptive summary of the invention in response to this item:

*Brief Summary of the Invention:*

*The device described herein is comprised of a cylinder with an internal helically shaped baffle which produces a series of cavities along the length of the cylinder in the lower half that are capable of containing a fluid. When the device is positioned at a angle from horizontal and a fluid such as water is introduced at the top of the device the resulting forces of the fluid on the helical walls of the cavities creates a torque around the axis of the cylinder. If the cylinder is then allowed to rotate and fluid is continuously introduced at the top, mechanical energy is generated from the lowering of the fluid in the chambers and can be extracted from the rotation of the cylinder for productive use such as in electrical generation.*

**Brief summary of Several Views of the Drawings (item g)** - Modifications to the brief description of drawings (paragraphs 19 thru 28) have been made to incorporate the depiction of bearing surfaces. This are documented above and included in paragraph 26.

**Detailed Description of the Invention (item h) –**

To conform with being a short and specific as is necessary, and other comments of the examiner, the following modifications are proposed in the detailed description, paragraphs 29 thru 55.

1. In Paragraph 29 on line 1 replace "*fabricated inside of*" with "*enclosed in*".
2. In Paragraph 29 on line 3 after "*open cavities*" insert "*capable of holding a volume of fluid are*".
3. In Paragraph 29 on line 4 after "*interior walls of the cylinder*" insert "*as depicted in figure 10*".
4. In Paragraph 29 on line 6 replace "*the surface, that*" with "*that surface. That*".
5. In Paragraph 29 on line 15 replace "*a supporting structure*" with "*the housing and a thrust bearing*".

Paragraphs 31 thru 44 currently are a portion of the detailed description. While they serve to describe the device on a relative basis to convention hydroelectric

systems in comparison and analytical terms, this discussion may be better included in the "Description of related art". The examiners advise in this area should the current location be inappropriate would be appreciated. The following changes have been made to improve the interpretation and readability of the equations in paragraphs 31 thru 43.

1. In Paragraph 31 on line 17 change "forms as calculated" to "forms is calculated".
2. In Paragraph 31 on line 20 change "so do the loss" to "so does the loss".
3. In Paragraph 31 append at the end the paragraph the following sentences: *"The calculations below demonstrate that in a typical hydroelectric turbine installation, that for every 100 tons of water and every 100 foot of elevation, there exists the potential energy of 7.53 Kilowatt-hours of energy. With a typical discharge water speed of 20 miles per hour, 1.01 Kilowatt-hours of energy is wasted in the form of kinetic energy and with a 1/10 degree Fahrenheit increase in temperature an additional 1.48 Kilowatt-hours of energy is consumed to heat the water and cannot be captured for productive use. This results in a maximum potential capture of energy of 5.04 of the original 7.53 Kilowatt-hours of energy or 67% efficiency. The device described herein has materially less exit fluid velocity and shearing friction resulting in fluid heating. The result is a potential increase in overall efficiency of up to 49% (33/67) from the energy lost in exit velocity and temperature alone.*
4. Replace Paragraph 32 with *"The potential energy in 100 tons of water at 100 ft is 7.53 KW-hours as calculated below:"*.
5. Replace Paragraph 33 - 35 the following in indented paragraphs:  

$$\text{Joules (energy)} = \text{mass in kg} * 9.81 \text{ m/sec}^2 \text{ (gravity)} * \text{height in m}$$

$$100 \text{ tons} * 907.185 \text{ kg/ton} = 90718.5 \text{ kg}$$

$$100 \text{ ft} * .3048 \text{ m/ft} = 30.48 \text{ m}$$

$$\text{Substituting: } 90718.5 \text{ kg} * 9.81 \text{ m/sec}^2 * 30.48 \text{ m} = 27,126,000 \text{ Joules}$$

$$27,126,000 \text{ Joules} / 3,600,000 \text{ Joules/KW-hour} = 7.53 \text{ Kilowatt-hours}"$$
6. Replace Paragraph 36 with *"The kinetic energy in 100 tons of water traveling at 20 mph is 1.01KW-hours as calculated below:"*.
7. Replace Paragraphs 37 - 39 the following in indented paragraphs:  

$$\text{Joules(energy)} = \frac{1}{2} * \text{mass in kg} * (\text{velocity in m/s})^2$$

$$100 \text{ tons} * 907.185 \text{ kg/ton} = 90718.5 \text{ kg}$$

$$20 \text{ mph} * (.44704 \text{ (meters/sec)} / \text{mph}) = 8.9408 \text{ m/s}$$

$$\text{Substituting: } \frac{1}{2} * 90718.5 \text{ kg} * (8.9408 \text{ m/s})^2 = 3,626,000 \text{ joules}$$

$$3,626,000 \text{ joules} / (3,600,000 \text{ Joules/KW-hour}) = 1.01 \text{ Kilowatt-hours}"$$
8. Replace Paragraphs 41- 43 with the following in indented paragraphs:  

$$\text{Gram-degree C(energy)} = \text{mass(grams)} * \text{change in Temp. (degree C)}$$

$$100 \text{ tons} * 907,184 \text{ grams/ton} = 90,718,400 \text{ grams}$$

$$.1 \text{ degree F} * 5/9 \text{ degree C} / \text{degree F} = .055556 \text{ Degree C}$$

$$\text{Substituting: } 90,718,400 \text{ grams} * .055556 \text{ Degree C} = 5,039,951 \text{ gram-degree C}$$

$$5,039,951 \text{ gram-degree C} * .29307 \text{ watt-hour/BTU} = 1,477,058 \text{ watt-hours}$$

$$1,477,058 \text{ watt-hours} = 1.48 \text{ KW-hours}"$$

**Claims (item i)** – Claims were originally submitted electronically in a separate section of the software provided, I did not have the opportunity to specify a separate electronic page or sheet, I have inserted a separate page break in this response prior to paragraph c1 to meet that specification. Line indentations have be incorporated in independent Claims 1 and 9 following each semicolon to delineate elements.

### **Item 3 – Unclear and grammatically incorrect wording**

The majority of these issues seem to be associated with the electronic filing process that was utilized. The majority of the issues I identified were not in my source documentation, but were somehow introduced in the electronic filing. I have attempted to correct the terms, most of which are transposed word segments and several of which are changed for clarity without introducing any new or modified concepts. Details as follows:

1. In Paragraph 1 on line 1 start a new paragraph between the words "*Appendix A*" and "*Generally*".
2. In Paragraph 1 on line 4 start a new paragraph between the words "*bulges etc*" and "*Helical baffles*".
3. In Paragraph 1 on line 15 start a new paragraph between the words "*device.*" and "*AquaHelix*".
4. In Paragraph 1 on line 18 start a new paragraph between the words "*patent.*" and "*Sealed*".
5. In Paragraph 3 on line 4 change "*preferencedevice ism*" to "*preferred device*".
6. In Paragraph 3 on line 11 change "*mechan and othersisms.*" to "*and other mechanisms.*"
7. In Paragraph 3 on line 12 change "*AquaHelix*" to "*AquaHelix,*".
8. In Paragraph 3 on line 13 change "*de hereinvoice*" to "*device herein*".
9. In Paragraph 3 on line 17 change "*otherwise unfeasible solutions*" to "*solutions otherwise unfeasible*".
10. In Paragraph 5 on line 5 change "*for transport and energy conversion.*" to "*for transport from one elevation to another and for energy conversion.*".
11. In Paragraph 6 on line 1 change "*reed in the the*" to "*resulted in the*".
12. In Paragraph 8 on line 3 change "*plyable*" to "*pliable*" and "*csause*" to "*causes*".
13. In Paragraph 13 on line 3 change "*displacemand nad*" to "*displacement and*".
14. In Paragraph 19 on line 1 change "*Drawi ng 1This*" to "*Drawing 1. This*".
15. In Paragraph 20 on line 1 change "*Drawi ng 2This*" to "*Drawing 2. This*".
16. In Paragraph 20 on line 1 change "*pitch result*" to "*pitch results*".
17. In Paragraph 21 on line 1 change "*Drawi ng 3This*" to "*Drawing 3. This*" and add a period at the end of the paragraph.
18. In Paragraph 22 on line 1 change "*Drawi ng 4This*" to "*Drawing 4. This*" and add a period at the end of the paragraph.
19. In Paragraph 23 on line 1 change "*Drawi ng 5This*" to "*Drawing 5. This*" and add a period at the end of the paragraph.
20. In Paragraph 24 on line 1 change "*Drawi ng 6This*" to "*Drawing 6. This*" and add a period at the end of the paragraph.
21. In Paragraph 25 on line 1 change "*Drawi ng 7This*" to "*Drawing 7. This*" and add a period at the end of the paragraph.
22. In Paragraph 26 on line 1 change "*Drawi ng 8This*" to "*Drawing 8. This*".
23. In Paragraph 26 on line 2 add "*and a typical mechanism to allow rotation around the axis while containing axial motion.*" after "*lengthening of the device.*".
24. In Paragraph 27 on line 1 change "*Drawi ng 9This*" to "*Drawing 9. This*" and add a period at the end of the paragraph.
25. In Paragraph 28 on line 1 change "*Drawi ng 10This*" to "*Drawing 10. This*" and add a period at the end of the paragraph.
26. In Paragraph 29 on line 2 change "*arees*" to "*angle*".
27. In Paragraph 29 on line 19 change "*deviforces*" to "*device*".
28. In Paragraph 29 on lines 19 and 20 change "*appr a ach physistatic ady*" to "*approach steady*".
29. In Paragraph 29 on line 26 change "*cylinders*" to "*cylinder's*".
30. In Paragraph 29 on line 28 change "*force fluid*" to "*force of the fluid*".
31. In Paragraph 29 on line 30 change "*cylinders*" to "*cylinder's*".
32. In Paragraph 30 on line 4 change "*struc*" to "*structure*".
33. In Paragraph 30 on line 5 change "*meansture*" to "*means*" and change "*utilizeddesired*" to "*utilized as desired*".
34. In Paragraph 30 on line 6 delete "*ent*".
35. In Paragraph 31 on line 6 change "*enr(gy)*" to "*energy*".

36. In Paragraph 31 on line 7 change “*eleva(ion)*” to “*elevation*” and “*en (gy)*” to “*energy*” and delete “*(water)*”.
37. In Paragraph 31 on line 8 change “*eleva(tion)*” to “*elevation*”.
38. In Paragraph 31 on line 17 change “*forms calculated*” to “*forms as calculated*”.
39. In Paragraph 44 on line 2 insert after the words “*crude estimates*” the words “*of typical turbine hydroelectric installations*”.
40. In Paragraph 44 on line 3 replace the words “*in this areas*” the words “*in these areas*”.
41. In Paragraph 44 on line 15 change “*gt of*” to “*given*”.
42. In Paragraph 45 on the last line change “*discussed b*” to “*discussed below*”.
43. Delete null Paragraphs 46 and 47.
44. In Paragraph 49 on line 4 change “*exam*” to “*example*”.
45. In Paragraph 50 on line 1 delete “*ple:*”.
46. In Paragraph 50 on line 5 change “*and*” to “*as*”.
47. In Paragraph 52 on line 8 insert a space after “*fall*”.
48. In Paragraph 54 line 3 change “*the*” to “*a*”.
49. In Paragraph 55 line 3 change “*as fluid in*” to “*as fluid is*”.
50. In Paragraph c3 on line 3, add a period after the phrase “*of the housing*” and begin a new paragraph, new claim, with the following phrase “*4. The device*”.
51. In Paragraph c8 on next to the last line replace the phrase “*convertthe ing*” with “*converting the*”.
52. In Paragraph c9 on line 1 replace the phrase “*we in*” with “*wherein*”.
53. In the Abstract on line 2 change “*Kinetic*” to “*kinetic*”.

#### **Item 4 – Failing to define the invention as required by 35 U.S.C. 112**

The following modifications are made to address the concerns cited:

1. In Paragraph c1 on line 2, after the word “*housing;*” insert an indented line beginning the following text “*sealed at ...*”
2. In Paragraph c1 on line 4, after the word “*horizontal;*” insert an indented line beginning the following text “*the housing being ...*”
3. In Paragraph c1 on line 5, change the words “*supported by a mechanism*” to “*supported by a thrust bearing*”
4. In Paragraph c1 beginning on line 6, delete the parenthetical phase “*(like that of a thrust bearing)*” and insert an indented line beginning the following text “*with a mechanism ...*”
5. In Paragraph c1 beginning on line 7, delete the words “*gears, belts or other*”
6. In Paragraph c1 on line 9, after the word “*productive use;*” insert an indented line beginning the following text “*whereby a fluid...*”
7. In Paragraph c2 on line 2, delete the words “*tapered cylinder or*”
8. In Paragraph c5 on line 4, delete the characters “*/or*”
9. In Paragraph c5 on line 5, change the word “*sustate*” to “*initiate*”
10. In Paragraph c8 on line 2, after the word “*housing;*” insert an indented line beginning the following text “*sealed at ...*”
11. In Paragraph c8 on line 5, after the word “*interior radius;*” insert an indented line beginning the following text “*positioned at...*”
12. In Paragraph c8 on line 6, after the word “*horizontal;*” insert an indented line beginning the following text “*the baffle being ...*”
13. In Paragraph c8 on line 7, change the words “*supported by a Mechanism*” to “*supported by a thrust bearing*”
14. In Paragraph c8 on line 9, delete the parenthetical phase “*(like that of a thrust bearing)*” and insert an indented line beginning the following text “*with a mechanism ...*”
15. In Paragraph c8 beginning on line 9, delete the words “*gears, belts or other*”
16. In Paragraph c8 on line 12, after the word “*productive use;*” insert an indented line beginning the following text “*whereby a fluid...*”
17. In Paragraph c9 on line 2, delete the words “*tapered cylinder or*”
18. In Paragraph c11 on line 4, delete the characters “*/or*”
19. In Paragraph c11 on line 6, change the word “*sustate*” to “*initiate*”

**Item 5 – Improper form as required by 37 CFR 1.75c**

Claims 3 – 8 and 11-14 have been revised to eliminate multiple dependent structure. In the process some combinations of the dependent claims have been lost but the essence of the device and specifically the preferred embodiment has been encompassed. Specifically the reference claims have been modified as follows:

Claim number (paragraph)	Change from Old References	Change to New Reference(s)
2 (c2)	"1"	"1,5,or 6"
3 (c3)	"1 or 2"	"1,5,or 6"
4 (c3)	"1 or 2"	"1,5,or 6"
5 (c4)	"1,2,3 or 4"	"6"
6 (c5)	"1,2,3,4 or 5"	"1,"
7 (c6)	"1,2,3,4,5 or 6"	"1,5 or 6"
8 (c7)	"1,2,3,4 or 5"	"1,5"
10 (c9)	"9"	"9, 11 or 12"
11 (c10)	"9 or 10"	"9"
12 (c11)	"9,10 or 11"	"9"
13 (c12)	"9,10,11 or 12"	"9,11 or 12"
14 (c13)	"9,10,11 or 12"	"9,11 or 12"

**Item 6 – Claims rejection under 35 USC , 102**

Significant differentiations from US Patent Number 6,729,840 are described below, in addition the further description in the first paragraph of the response to item 7 below is also applicable.

The device in the referenced patent (840) is essentially filled with water and allows fish to swim through the center area where no blades are present. The device relies on a flow of water to turn the blades much like a fan as opposed to the device I claim (512) which carries a contained volume of water from one elevation to another more like that of a water wheel.

Independent claims 1, 3 & 5 of 840 state "a plurality of open center turbine blades". The device in 512 contains no such blades, 512 has a single auger type helical baffle to form containment cavities which hold a volume of water which is lowered in a stable and essentially "motionless" state with the exception of the linear motion of the entire cavity in an axial direction down the device. Dependent claims, 6, 7, 9, 10 & 11 speak of the modification of "flow" of water thru the blades and center section, neither of which are present I 512.

Claim two of 840 calls for a "stationary housing allowing the water pressure to equalize with the pressure in the vicinity of the blades. There is no such function in 512 as the entire device is open to the atmosphere and the only pressures developed are done so by the water depth in each cavity and are essentially static and at equilibrium. The 840 invention is described as a "machine for producing electricity from a water current". It is designed to be essentially filled with water and takes energy out of the "flow" of water thru the device. 512 does not use a current of water and is not applicable when filled with water, it is only practical when filled with cavities of water which cannot physically exceed ½ the device's volume.

**Item 7 Prior art of record –**

The following describes differentiation from each of the referenced patents and has been inserted in the specification after paragraph 3

Much of the prior art that has been identified in a patent search has embodied numerous variations of using a blade of some manner (turbine, impeller, vane or wing) similar to a fan, whereby the inertial force of a fluid or gas in motion is impinging against the blade or the Bernoulli effect of passing over the blade results in a force and resulting in motion. The significant differentiation of the device proposed in this patent is that the helical baffles serve only to contain the fluid and no fan-like or wing like effect is present in the device. The development of power is effected from the conversion of elevational potential energy to kinetic mechanical energy as a mass of fluid is lowered from one elevation to a lower elevation. The movement of fluid in 512 is positive displacement in nature as a contained volume of fluid in a baffle area is constrained and lowered as a batch. The small relative amount kinetic energy associated with the gradual lowering of the batch of water is inconsequential to the conversion and capture of the potential energy and in fact there is no mechanism present in 512 to attempt to capture the kinetic component of the energy contained in the fluid. In the evaluation of the numerous prior arts detailed below the reliance on the kinetic energy of a moving stream of fluid is a significant distinction which is described above and is referenced in the subsequent details as "reliance on conversion of kinetic energy"

US Patent 6,327,994 December 11, 2001 - Labrador

This amazing piece encompasses a mass of 127 related claims all of which are dependent claims to Claim number 1 or are dependent to another claim which in turn is dependent on claim one. Claim one states in part to "... impinged and to drive moving fluids/air in order to pump/compress and to convert ..." The proposed device described in the 512 application does not purport to extract energy from moving fluids or air and therefore is distinct and cannot be in conflict with the claims of 994.

US Patent 928,782 July 20, 1909 - Morrison

Unlike the device proposed in 512, this device necessitates being placed "in a water course" and deriving energy from the impinging of moving water on an "impact area for causing rotation of the cylinder." This is one of the devices that as described above, "relies on the conversion of kinetic energy" of flowing water, similar to that of putting an impeller in a moving stream. This is significantly distinct from the mechanism in 512 as previously discussed.

US Patent 4,218,175 August 10, 1980 - Carpenter

This device describes a wind turbine and does not apply to fluids, in addition it "relies on the conversion of kinetic energy" from the medium, in this case a gas which is materially different from the mechanism described in 512.

US Patent 4,272,685 June 9, 1981 - Toyama

This patent describes a variation on a traditional fluid turbine where by fluid in motion is converted by turbines to mechanical energy. Fluid is taken from the "bottom of the dam" and is subsequently converted. This 512 device is not infringing as it does not propose nor would it be possible to utilize an off take at the bottom of a dam and the 685 patent "relies on the conversion of kinetic energy" as previously discussed.

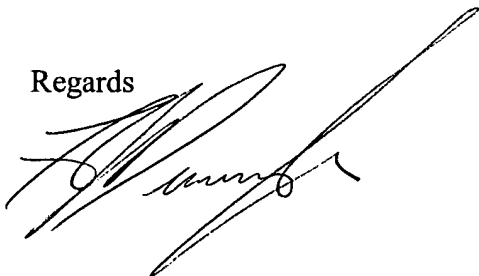
US Patent 4,325,354 April 20 1982 - Fuchs

This patent describes a variable transmission device intended to optimize the speed of a wind driven blade for maximum efficiency. It is non applicable to the 512 device proposed as 512 is a positive displacement device and the ratio of fluid flow to rotational speed is not subject to slippage or optimization in the manner described in 354.

US Patent 4,512,716, April 23, 1985 - McHenry et al.

This patent describes a device to optimize the radial velocity profile of a gas flow into a turbine to optimize efficiency such that the speed of the gases adjacent to the axis is faster than that approaching the radius. As the device described in 512 does not extract energy from the kinetic energy of motion or pertain to the extraction of energy from gases of any form, it is not subject to infringement of this patent.

Regards

A handwritten signature in black ink, appearing to be 'A. M. ...', written over the word 'Regards'.



F. J. Duncan Jr.